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DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume VIII

MARCH, 1935

No. 2

**More Technical  
Than Shop Men  
Go to Lectures****Cleveland Course Registrar  
Analyzes Attendance**

The majority of the men who attended the Cleveland Chapter's fall lecture course were engineers and technical men, most of them college trained.

A splendid detailed report prepared by A. H. Allen, registrar of the course, on "Physical Testing of Metals," presented by Harry D. Churchill of Case School of Applied Science, shows that 75 men were metallurgists, chemists, engineers, and other technical men, whereas only 5 were tool and die makers, hardeners, and melters. There were 19 foremen and superintendents and 27 salesmen, executives, and other office personnel.

Of the 155 who returned information, 96 had attended college and 20 of them had engaged in graduate study. While most of the men were within 5 years of their college work, as many as 38 had been out of school 15 years or more.

Such information, while it may vary in different localities and for different course subjects, should be of interest to other chapters in planning educational work. A. H. Allen, Penton Publishing Co., Cleveland, has a few copies of the report available for circulation among those interested.

Attendance charts and figures compiled by Mr. Allen are also interesting. Average attendance was 154, net attendance 229, which figures to 40.6% of the chapter membership. Sixty-two had perfect attendance records.

Largest attendance was at the first lecture, with a notable decrease after the third, indicating the difficulty in maintaining interest after the newness has worn off.

The course was open to the Canton-Massillon Chapter and 14 members took advantage of the opportunity.

From the time publicity was first given to the course until its end, 75 new members joined the Chapter, 45 of whom registered for the course.

"It has been interesting," says Mr. Allen, "to observe the apparent unquenchable thirst for more knowledge which is characteristic of technicians of all ages and in all branches of metal working industries. . . . With these courses now established parts of chapter routine, it will be difficult ever to discontinue them without subsequent serious loss of membership."

**C. of C. Group Meets  
With Rochester Chapter***Reported by E. W. Moore*

Rochester Chapter, Feb. 4—The annual joint meeting with the Superintendents and Production Managers' Group of the Industrial Management Council of the Rochester Chamber of Commerce was attended by about 400.

After dinner at the Chamber of Commerce Mr. Ivar Lundgaard of the Production Managers' Group very graciously welcomed our Chapter, and then turned the meeting over to our chairman, W. Trefor Morgan.

E. W. P. Smith, consulting engineer for the Lincoln Electric Co., Cleveland, gave a very interesting talk on electric arc welding with both a.c. and d.c. machines, effectively supplemented with a series of lantern slides showing many actual applications. Great enthusiasm was manifested by the number of questions after his talk.

The Annual Bowling Party for members and guests was announced for March 22 at the Eagles' Club.

**Prominent in A. S. M.—Promoted in Business**

Walter Mathesius



Edgar C. Bain

Both of these men are trustees of the American Society for Metals. Both received promotions effective Feb. 1. Both are with the United States Steel Corp.

Edgar C. Bain has been appointed Assistant to Vice-President in charge of metallurgy and research, U. S. Steel Corp., and Walter Mathesius has been appointed General Superintendent of South Works, Illinois Steel Co., a Steel Corporation subsidiary.

WALTER MATHESIUS was educated at the Institute of Technology of Berlin, Germany, where he received the degree of Doctor of Engineering.

He came to America in 1911, and was first employed at the South Works of the American Steel & Wire Co. in Worcester, Mass. He went to the South Works of the Illinois Steel Co., Chicago, in 1912, and after a few years rose to be superintendent of the Blast Furnace Department.

In 1925 he became assistant general superintendent of the South Works, devoting the major part of his attention during the next four years to the development of alloy steel production.

Mr. Mathesius holds memberships in the American Institute of Mining & Metallurgical Engineers and the American Iron and Steel Institute, and has presented technical papers before both associations. He is also a past chairman of the Chicago Chapter, A.S.M.

**Book Review, Alloy Irons Start Golden Gate's Year***Reported by C. W. Horack*

Golden Gate Chapter, Jan. 21—The Chapter started the New Year with an unusually well-attended and enthusiastic meeting at Capri's restaurant in Oakland. Everybody seemed to be so engrossed in some sort of conversation during the dinner hour that the usual coffee talk was omitted.

First speaker of the evening was James Coulter of Earle M. Jorgensen Co., who gave an excellent review of J. P. Gill's recent book on tool steels, comprising a series of lectures presented at the last Metal Congress. In the brief period allowed, Mr. Coulter discussed only the various classes of tool steels, giving their general compositions, uses, and applications. This subject was of particular interest in view of the large number of steels on the market today and the apparent confusion which exists among users regarding their selection and application.

Next on the program was a discussion of alloy cast irons by Ed Kottnauer, western representative of Climax Molybdenum Co. Mr. Kottnauer needed no introduction to the older members of the Chapter; nevertheless

EDGAR C. BAIN attended Ohio State University, where he received Chemical Engineering and Master of Science degrees.

After a few years of teaching chemical engineering at Ohio State University and metallography at University of Wisconsin, Mr. Bain joined B. F. Goodrich Co. as chemical engineer. After the War, during which he served in the Chemical Warfare Service, he returned to metallurgy at the National Lamp Works of the General Electric Co.

From 1922 to 1924 he was research metallurgist at the Atlas Steel Co. (now Ludlum), and from 1924 to 1928 he held a similar position with the Union Carbide & Carbon Research Laboratories. He then became metallurgist for United States Steel Corp. at Kearny.

Mr. Bain's work has largely been confined to fundamental studies of physical metallurgy. He has contributed to the literature on the nature of solid solutions, the hardening of high speed and alloy steels, and more recently, high chromium alloys and stainless steel.

In 1932 he delivered both the A.I.M.E. Henry Marion Howe Memorial Lecture and the A.S.M. Campbell Memorial Lecture.

Chairman Si Edwards could not pass up the opportunity to give Ed the kind of introduction an old friend and active former member of Golden Gate Chapter deserves, especially since he had made a special trip north from Los Angeles.

Mr. Kottnauer gave a most interesting and impartial talk, explaining first what is generally understood by high test cast iron, its properties, and uses. Then he enumerated the common alloying elements and their effect on its properties. Foundry problems for alloy irons and the buyers' attitude toward higher cost were discussed. Heat treatment was also fully covered.

Considerable discussion followed Mr. Kottnauer's talk. Mr. Drake of Johnson Gear Co. was interested in the determination of extra cost for alloy cast irons, as was also Mr. Paine, a former member who recently transferred from Cleveland. Mr. Williams of Merco-Nordstrom Valve Co. was interested in the machinability of high test irons.

**Committee for  
Nominating New  
Officers Selected  
Suggestions From Chapters  
Or Individuals Welcomed**

In accordance with the new constitution of the American Society for Metals adopted in Dec., 1933, President B. F. Shepherd has selected the following Nominating Committee from the list of candidates submitted by the chapters:

Jerome Strauss, Chairman  
Vanadium Corp. of America  
Bridgeville, Pa.  
(Pittsburgh Chapter)  
R. T. Porter  
Heppenstall Forge Co.  
(New Haven Chapter)  
S. L. Hoyt  
A. O. Smith Corp.  
(Milwaukee Chapter)  
F. A. Elshoff  
Crocker-Wheeler Electrical Mfg. Co.  
(New Jersey Chapter)  
T. J. Black  
Canton Drop Forging & Mfg. Co.  
(Canton-Massillon Chapter)  
S. A. Silbermann  
Claud S. Gordon Co.  
(Indianapolis Chapter)  
D. M. Fraser  
Peerless Engineering Co.  
(Ontario Chapter)

This nominating committee will meet during the third full week in the month of May, at a place designated by the chairman, and shall name one candidate for each of the following offices:

President ..... 1 year  
Vice president ..... 1 year  
Treasurer ..... 2 years  
Two directors for ..... 2 years each

Assistance from local chapters and individual members will be welcomed by the Committee in the form indicated by the following abstract from Article IX, Section 1 (b) of the constitution:

"As an aid in making nominations, the Nominating Committee, and particularly the Chairman of the Committee, may canvass the executive committees of local chapters for written endorsements for consideration by the Nominating Committee. The Nominating Committee shall also give consideration to written endorsements forwarded by individual members or representatives of members of the Society to the Nominating Committee for its consideration. Endorsements of a local executive committee shall be confined to members of its local chapter or representatives of firms or corporations which are members of its local chapter, but an individual member or representative of a member of the Society may suggest any qualified members or representatives of members of the Society for consideration by the Nominating Committee. Immediately after the candidates are thus nominated, the Nominating Committee shall report the names of the nominees to the Secretary and the report shall be published by the Secretary in one of the publications of the Society not later than June 15th of the same year."

**Meeting Is Dedicated to  
Mathews; Krivobok Speaks***Reported by C. E. Jackson*

Washington Chapter, February 13—The Chapter as a whole and the speaker of the evening, Dr. V. N. Krivobok, professor of metallurgy at Carnegie Tech, dedicated the 5th regular meeting of the season to the memory of Dr. John A. Mathews, who addressed the Washington Chapter on Jan. 9th on his last public appearance before his untimely death.

Dr. Krivobok presented a portion of his 1934 Campbell Memorial Lecture on alloys of iron and chromium. He pointed out by means of many examples that the properties of alloys may change suddenly and unexpectedly with slight changes in the concentration of the alloying constituents. An animated film showed in an interesting and clear manner the changes in the phase diagram of Fe-Cr with changes in composition.

# THE REVIEW

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*Devoted to the interests of the American Society for Metals*

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RAY T. BAYLESS ..... Editor  
M. R. HYSLOP ..... Managing Editor

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### Aluminum Steps Up Compression Ratio In Auto Engines

Reported by Ernest O. Olds

New Jersey Chapter, Feb. 11—The regular monthly meeting was held at the Essex House in Newark with 40 members present at the dinner and approximately 125 for the meeting.

An announcement was made by Educational Committee Chairman Mudge that a course of eight lectures will be given by W. R. Fraser at the Newark College of Engineering starting March 12 and continuing for eight weeks. This series will be patterned after the general outline on heat treating and metallurgy which has been prepared by Prof. A. Allen Bates of Case School of Applied Science, Cleveland.

Chairman Hall introduced the speaker of the evening, G. D. Welty of the Aluminum Co. of America, who presented a splendid paper on "Aluminum and Magnesium Alloys." He discussed briefly the historical development of aluminum.

One of the largest outlets for aluminum in the early days was for cooking utensils, but with the growing use of high copper alloy in the automobile industry, the use of light metals expanded considerably. Since the adoption of high compression ratio, the aluminum piston has been used extensively, due to its high thermal conductivity and light weight. Recently, a 12% silicon alloy known as "Lo-Ex" has been developed which has a lower coefficient of expansion, and therefore is better suited for this application. Aluminum cylinder heads have also permitted stepping up the compression ratio.

Up until 1921, the copper-aluminum alloys were more prominent, but the more fluid and leak-proof silicon-aluminum alloys are beginning to find use, particularly for sand and die castings.

The most important wrought alloy is "Dural," which contains 4% Cu, 0.50% Mn, 0.50% Mg. This alloy can be heated to 900 to 950° F. and water quenched to produce a soft, ductile alloy, but on aging at room temperature for three to four days, the strength and hardness increase to approximate a mild steel. This alloy is known commercially as 17S.

Magnesium alloys, being lighter than aluminum and of comparable physical properties, have come into prominence particularly in the aircraft industry. Although magnesium alloys have 33 1/3% lower specific gravity, the actual difference in weight between aluminum and magnesium castings approximates 25%, due to the desirability of increasing the sections of castings.

Magnesium casting alloys contain from 6 to 8% Al, and can be heat treated to the same properties as the aluminum casting alloys. Magnesium alloys can also be had as die castings, forgings, extruded shapes, and sheet.

An interesting discussion regarding the welding and riveting of fabricated parts followed the paper.

### "Machinability and Grain Size" Elicits Many Questions

Reported by Elam E. Williams

Indianapolis Chapter, Jan. 14—Seventy-four members and guests were present at the monthly meeting. After the dinner Howard M. Meyers, prominent attorney, gave a coffee talk on "Firearms and Their Ancestry."

C. F. Goldcamp, metallurgist, Jones & Laughlin Steel Corp., then presented a paper and slides on grain size and machinability, which was very interesting and elicited several questions that were promptly answered.

The Educational Committee reported quite an interest being taken in the school, and six new members were announced. The Indianapolis Chapter seems to have taken on new life, and some very good meetings are promised for the future.

### Tools for Cutting Metal—Past, Present, and Future

Reported by E. W. Moore

Rochester Chapter, Jan. 14—C. J. Oxford, chief engineer of the National Twist Drill & Tool Co., Detroit, gave a very interesting talk on metal cutting tools—past, present, and what we may reasonably expect in the future.

Mr. Oxford's years of service with his company, together with the tremendous amount of research work on metal cutting, and his co-authorship of several technical papers on metal cutting and allied subjects, placed him in an outstanding position to present his subject in a very delightful and educational manner. Lantern slides showed the many processing operations on twist drills and milling cutters.

The members displayed their interest and enthusiasm by the many questions which were asked after the speaker had finished.

### Material-Treatment Cost Ratio Varies

Reported by J. C. Patton

Chicago Chapter, Feb. 14—The discussion of John L. McCloud before the Chicago Chapter emphasized the economic balance between cost of materials and cost of treatment in which the volume of production is frequently the principal factor in determining what process the manufacturer is to choose. Mr. McCloud is chief of the Chemical and Metallurgical Division of the Henry Ford Engineering Laboratory.

Naturally speaking as a technician in perhaps the outstanding mass production industry of America, Mr. McCloud demonstrated one extreme of the material-treatment cost ratio. While he is known as one of the leaders in the introduction of alloy steels in American mass production, he emphasized his point by the declaration that it would be entirely possible, technically, to make almost every part of a modern automobile of plain carbon steel, by giving close attention to the carbon content and subjecting the part to appropriate heat treatment.

To the 500 members and guests who heard him one of the most interesting

### Ohio Chapters Plan All-Day Session for April Meeting

An all-day session is being planned for the annual tri-chapter meeting of the Cincinnati, Columbus, and Dayton Chapters at Dayton on April 15.

An afternoon symposium on the use of controlled atmospheres in heating of metals will cover their use in the joining of metals (to be presented by H. M. Webber of General Electric), in tool hardening (S. K. Oliver, Delco Products Div.), and in production heat treating (R. J. Cowan of Surface Combustion Corp.).

Dinner will be attended by the National Officers, and will be addressed by Dr. Anson Hayes, director of research, American Rolling Mill Co., on "Metallurgical Advances."

The big feature of the evening session will be the presentation of Dr. Krivobok's Campbell Memorial Lecture.

### Creep Gives Turbine Engineer "The Jitters"

Reported by J. S. Marsh

New York Chapter, Jan. 21—"The Creep Strength of Steel at Moderately High Temperatures from the Point of View of the Designing Engineer" was the delicately qualified title selected by E. L. Robinson of the Turbine Engineering Dept., General Electric Co., for his New York address.

So far as magnitudes are concerned, creep, even at 400° C., causes the turbine engineer to jitter, because about 0.2 mils is the limit for turbines. This is negligible for many applications. Having shown that the turbine engineer moves the decimal point to the left, Mr. Robinson proceeded to describe G. E. testing methods.

The inclement weather held down attendance a trifle, but not the discussion, even though Mr. Robinson somewhat scotched the metallurgical wolves at the outset by proposing to treat the subject from the standpoint of the designing engineer. Marked interest in the address and the nature of the discussion proved that the subject of creep is hardly on the wane.

### Joint New England Meeting

All New England chapters are cooperating in a joint meeting to be held on April 5.

A plant visitation to Brown & Sharpe Mfg. Co., Providence, R. I., begins at 2:00 p.m. Dinner at the Narragansett Hotel will be followed by a coffee talk on a non-technical subject and an address by J. B. Johnson of Wright Field, Dayton, Ohio, on "Materials for Aircraft."

### Good Properties Due to Cold Work

Reported by A. O. Schaefer

Philadelphia Chapter, March 1—Special meetings and lectures have crowded the calendars of the Philadelphia Chapter members; nevertheless, a large number of them gathered to hear the first discussion of cold finished steel products the Chapter has had in many a day.

J. D. Armour of the Union Drawn Steel Co. was the speaker. His talk was exceedingly well planned. It was clearly divided into three sections, each with a series of excellent slides.

In the first part, Mr. Armour considered the manufacture of cold finished bars and shapes. The illustrations showed all the essential steps.

Following this was a discussion of properties. Tensile tests of various grades of steel after varying amounts of reduction were compared with properties of same size bars, hot rolled and heat treated.

In the third section Mr. Armour discussed the selection of the proper grade of cold finished bar for a specific purpose.

In the past cold finished bars have often been selected for their finish, accurate size, and price, but it is the speaker's contention that they have not yet received the consideration due them for their physical properties.

A lively discussion followed this very interesting paper. Mr. Winlock of Edw. G. Budd Mfg. Co. said that only about 2% of the steel used in his plant is heat treated. We are so used to obtaining physical properties by heat treatment that we often overlook the fact that they can be had by other means.

During the discussion, Mr. Armour had the opportunity to correct a common misconception. Too many people think the hardness is a surface condition. This is not true. The effects of cold drawing are quite uniform to the center of bars up to 2 1/2 in. in diameter. Different steels have a different response to cold work. Eighteen-eights shows a tremendous increase in hardness.

There was also considerable interest in the effect of heat on bars that have been cold drawn. The effects of cold work on physical properties are generally removed by temperatures of 1000 to 1250° F. Temperatures around 600° F. may increase the physical properties, especially the yield point.

The meeting was preceded by the usual chapter dinner which was addressed by R. F. Perrott of Atwater Kent Mfg. Co. on present-day trends in radio.

### Wrought Iron Economically Made by Aston Process

Reported by C. E. Jackson

Washington Chapter, Dec. 12—The Chapter was fortunate in having Dr. James Aston of Carnegie Institute of Technology, one of the foremost authorities in the United States on wrought iron and its uses, as speaker for the evening.

Dr. Aston pointed out that until the last 75 years wrought iron made up practically all of iron history. Wrought iron is economically produced in competition with other materials for corrosion and fatigue resisting purposes. Dr. Aston described the experimental development of the Aston process and showed moving pictures taken in an up-to-date plant of the complete manufacture of wrought iron by this method.

For future development Dr. Aston mentioned the possibility of new materials made by this process with various slags and different base metals. The widening of the field of application should accompany more economical production.

In an interesting discussion Dr. Aston suggested the reason for the corrosion resistance of wrought iron and considered the effect of cross rolling on wrought iron properties.

## Sauveur Honored, Bain Is Speaker

Reported by A. O. Schaefer

Philadelphia Chapter, Jan. 25—The Chapter held its Second Annual Sauveur Night in honor of its long friendship with this distinguished metallurgist. Over a period of years, Dr. Sauveur has often been willing to take time to come down to Philadelphia and address the Chapter. His talk last year was so thoroughly enjoyed that it was decided to commemorate our friendship by holding one meeting every year in his honor.

Edgar C. Bain, speaker for the occasion, very fittingly paid tribute to Professor Sauveur by saying that "most of us have learned most of our metallurgy from him."

Mr. Bain talked on "The Properties of Steel as Controlled by the Mode of Transformation," and treated us to some of the finest photomicrographs we have seen in a long time. His study of the transformation of austenite explains many of the mysteries of heat treatment.

Added interest was manifest in his talk, since it tied in with the series on the properties of steel, such as "Grain Size" and the "P-F Characteristic of Steel," which we have been enjoying this year.

At the close of his talk, Mr. Bain found himself the center of a lively discussion. Some felt that he didn't believe in the existence of troostite, and he was forced to define his terms. Others wished to join in a prolonged talk on the mechanism of the transformation of austenite under varying conditions.

Representatives of the sustaining members were the guests of the Chapter at this meeting, and at dinner preceding it, which was addressed by O. Howard Wolfe, Cashier of the Philadelphia National Bank.

The meeting was also notable for the presentation of a unique gavel by Norman Meochel to Chairman F. B. Foley. This gavel and its anvil have been fabricated from various kinds of stainless steels by Dr. Nelson and Mr. Snader. The new gavel's clear and ringing notes closed this most successful meeting.

## Steel Castings Flexible In Properties and Sizes

Reported by Clarence E. Jackson

Washington Chapter, Nov. 14—The second meeting of the Chapter was addressed by Major R. A. Bull, a well-versed consultant on steel castings, whose subject was "The Steel Casting Industry—Its Metal Production and Product Diversification."

According to Major Bull, material made in the steel foundry has a maximum degree of flexibility as to obtainable physical properties and commercially attainable shape and size. Significant characteristics of the melting processes that are commercially favored by the steel foundrymen in America were interestingly enumerated.

The speaker pointed out that almost a third of the 75 kinds of steels being put in castings have been covered by A.S.T.M. standard and tentative specifications—a tribute to modern metallurgical progress. The increasingly favorable cooperative relationship between welding and steel founding substantiates the fact that the two arts are complimentary rather than exclusively competitive.

## Class to Attend Convention

Fourth-year students at University of Missouri School of Mines and Metallurgy, Rolla, Mo., are due for a week's vacation of sorts next fall, when Charles Y. Clayton, professor of metallurgy and ore dressing, plans to take his senior class to Chicago for the week of the National Metal Congress and Exposition, Sept. 30 to Oct. 4. Such meetings, he finds, are well worth while for the students.

## International Amphitheatre, Chicago



Huge Exhibit Halls and Fine Meeting Rooms Will Serve the National Metal Congress, Meeting Here in October. At the left is the entrance to a free parking lot accommodating 4,000 automobiles.

## Highducheck Addresses Pittsburgh Blacksmiths; Researchers Also Meet

"Blacksmiths" in the Pittsburgh Chapter had their "night" last month when J. M. Highducheck, supervisor of tools in Westinghouse Electric & Mfg. Co., addressed a special group on "Tool Steels and Materials." This meeting was one of a series being held on alternate months by two groups (the blacksmiths and the research-minded members). They are in addition to the regular monthly chapter meetings.

Mr. Highducheck spoke at some length on tool design, clearances, and processes of tipping, and discussed the problem of carbide versus alloy steel tools. He also cited the experience of the Westinghouse Co. in standardizing its tools.

The practical points he brought out were the subject of considerable discussion.

The first of the research group meetings, which are held in conjunction with the Pittsburgh Science of Metals Club, was reported in the January issue of THE REVIEW. Mr. E. C. Bain addressed the second meeting on "Properties of Steel as Influenced by Their Mode of Transformation."

Mr. Bain showed many lantern slides which showed clearly the transition at subcritical temperatures of austenite directly to pearlite. The intermediate phases, troostite to sorbite, were seen to have the genesis of a pearlitic structure when viewed at high magnifications. Several sets of data were presented which indicated marked changes in properties with change in the amount and distribution of the pearlite and austenite.

## Foundrymen Invited to Hear Cast Iron Expert

Reported by Gordon T. Williams

Cleveland Chapter, Feb. 4—"High Strength Cast Iron" was the subject of a talk given by Hyman Bornstein, of Deere & Co. All foundrymen in the Cleveland area were specially invited to attend this meeting, and 150 were present for the program.

Mr. Bornstein, whose notable contributions on engineering cast iron have been widely published, gave us an excellent summary of current practice in casting and use of quality iron. A review of his talk is presented in another section of this paper.

A. C. Denison, president, Fulton Foundry & Machine Co., acted as technical chairman and ably handled the spirited discussion which followed.

Coffee talker was John A. Penton, chairman of the Board, Penton Publishing Co. From his wealth of experience and observations in the iron and steel industry Mr. Penton drew many interesting thoughts on "Regimentation" and the effects of the New Deal.

Educational Chairman Croft described the Chapter's next course on "Engineering Alloy Steels" soon to start, and presented the lecturer, Mr. E. E. Thum of Metal Progress. New members were introduced by Membership Chairman Thurston.

## Stresses in Press Work

Reported by L. E. Raymond

New Haven Chapter, Jan. 17—The Chapter was treated to a very excellent talk by E. V. Crane, staff engineer of the E. W. Bliss Co. of Toledo, on the "Plastic Working of Metals and Metal Working Presses."

Mr. Crane discussed all phases of metal working by forming with presses, and showed extensive slides which brought out the operations and stresses to which the metals are subjected during these operations. The design of the tools and machines used, together with the limitations and advantages of each design, was taken up in detail by Mr. Crane.

## Aluminum Now Practical For RR Wheels and Axles

Reported by Paul S. Lane

Baltimore Chapter, Jan. 28—"Railroad car wheels and axles of strong aluminum alloys are now a practical possibility"—this, and many other startling applications of this light weight material to railroad passenger, freight, and tank car construction were illustrated and explained by H. D. McKinnon, development engineer, Aluminum Co. of America, at Baltimore Chapter's fourth monthly meeting. Mr. McKinnon ably handled the subject, in the absence of A. H. Woolen, manager of railroad sales of the same company, who was unable to be present due to illness.

With the trend toward higher speeds in all modes of transportation, the use of extruded strong aluminum alloys of the copper-bearing duralumin type has enabled dead weight to be cut as much as in half, with resulting decrease in power and maintenance costs. Interior trim, body sheets, struts, framing, trucks, and finally complete cars of aluminum alloys—all were well covered by means of numerous lantern slides and detailed explanation. Several slides showing head-on collisions and wrecks illustrated the strength and impact resistance of extruded aluminum framework and castings. One handicap has been that, in many cases, the design of parts must be patterned from existing steel shapes, whereas greater improvement would be had by designs adapted particularly for the light alloys.

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## Floor Plans Ready For Fall Exposition

Once again the wheels are starting to turn on the machinery which runs the Annual National Metal Congress and Exposition to be held in Chicago, Sept. 30 to Oct. 4. Some speed has been gathered during the past few weeks, and floor plans of exhibit space are now available at the National Office.

The new International Amphitheatre, built in 1934 at a cost of over two million dollars, will house the exposition. Total available exhibit space here covers over 250,000 sq.ft. Meeting rooms and club facilities at the beautiful and well-known International Inn and Saddle and Sirloin Club will also be made available.

A.S.M. headquarters will be at the Palmer House. Other cooperating societies are the Iron & Steel and the Institute of Metals Divisions of the American Institute of Mining & Metallurgical Engineers, the American Welding Society, and the Wire Association.

The success of J. P. Gill's lectures on tool steels at the Convention last fall has instigated a repetition of this feature. Dr. M. A. Grossmann, Illinois Steel Co., is to be the lecturer and "heat treating" will be the subject.

H. W. McQuaid, metallurgist, Republic Steel Corp., has been selected by the Board of Trustees to deliver the Edward De Mille Campbell Memorial Lecture. His subject has not yet been announced.

Preparations for the other technical sessions have been progressing at full speed since the meeting of the Publication Committee on Jan. 4. Papers on technical researches will be presented by prominent men in the metallurgical field who will report the latest developments.

## Final Dates For Papers

While there is still ample time for members and others to submit technical papers for presentation at the Chicago Congress, the National Office will appreciate having the required information as far in advance of the limiting date for receipt of papers as possible. All offers of papers should be accompanied by a summary which should make clear the intended scope and important features.

Final date for acceptance of papers for preprinting is June 1, 1935, and for presentation but not preprinting, July 1, 1935.

## P-F Characteristic as Test For Header Die Steels

Reported by F. G. Anderson

Rockford Chapter, Jan. 18—At National President's night the Rockford Chapter was highly receptive to President Shepherd's paper on "P.F. Characteristics of Steel" (which has already been reported in THE REVIEW), and several questions were asked as to application of the test to header die steels. Mr. Shepherd was of the opinion that higher core hardness would result in longer die life.

Our well-known and never-to-be-forgotten Bill Eisenman was present. All members and guests sat forward on seat's edge to hear him tell the one about the "hereafter" in his pleasant "Eastern" accent. In a more serious manner, and yet with a very broad smile, he reported the growth of the Society nationally. The Rockford Chapter feels that nothing but good can come from a visit by "old Bill."

## Chapter Officers—Corrected

In the list of Chapter Officers published in the January issue of THE REVIEW an error was made in the personnel of the Cleveland Chapter Executive Committee. The names of A. H. Allen and W. H. White should be replaced by E. F. Burke and A. M. Thurston.

# THE REVIEW

## Chapter Hears Talks on Firearms, Furnace Gases

*Reported by Elam E. Williams*

Indianapolis Chapter, Feb. 11—Mr. Howard Meyers was again coffee talker at this Chapter meeting, speaking on "The History of Sporting Arms and Ammunition." After his speech, committee reports were heard, Richard Wagner reporting ten new members this month.

We were sorry to hear that Dr. E. W. Esslinger, who was to have given the address of the evening, was confined to the hospital with blood poisoning, but we were fortunate in securing as speaker Mr. Niel Lowe from the Hevi Duty Electric Co. Mr. Lowe spoke ably on "The Influence of Furnace Atmospheres on Correct Heat Treatment Practice."

## Impact Is Most Useful Low Temperature Test

*Reported by F. H. Clark*

New York Chapter, Feb. 18—At the monthly meeting held at the Pennsylvania Hotel, Robert Sergeson, metallurgist of Republic Steel Corp., spoke on "Properties of Metals at Low Temperatures."

The effect of low temperatures is coming into prominence more all the time in such fields as dewaxing of oils and transportation. Mr. Sergeson said that impact tests are most valuable for measuring the effect of low temperature on metals.

A 2% nickel steel gives better service than a plain carbon steel at low temperatures. Dissolved oxygen in steel leads to low impact values and a fine grained steel is superior to a coarse

grained one. The chromium-vanadium and nickel-molybdenum steels give very excellent results at low temperatures.

During the discussion, Dr. Heindlhofer, U. S. Steel Corp., said that at low temperatures, the results of tensile, impact and torsion tests are not comparable because all mechanical tests measure complex properties, such as cohesive forces and gliding forces between atoms, rather than simple properties.

A. B. Kinzel mentioned the fact that rate of loading is important for steels subjected to low temperatures. An important range in the transportation industry is -40 to -60° F., and it is here that many steels fail.

Dr. H. W. Gillett suggested that precipitation hardening may be a factor that leads to changes in impact values at these low temperatures.

## New Representatives for Hevi Duty Electric Co.

Claud S. Gordon Co., Indianapolis, Ind., has been appointed district representative of the Hevi Duty Electric Co., Milwaukee. S. A. Silberman, chairman, Indianapolis Chapter, A. S. M., will be in charge of this office.

Case Hardening Service Co., 2281 Scranton Rd., Cleveland, Ohio, has been appointed district representative for the State of Ohio.

L. A. Shea, formerly Ohio district manager for Hevi Duty, has been made district manager for Illinois and the upper half of Indiana. His office will be in Chicago, and he has transferred from the Cleveland to the Chicago Chapter of the Society. He will have charge of the Company's service and sales agency on electric heat treating furnaces.

## Send in Coupon Below for These Helpful Bulletins

### Strip Steel Refinement

Precautions in pickling, annealing, rolling, and inspection which constitute the Blair controlled processing for cold rolled strip steel are described in a beautifully printed booklet by Blair Strip Steel Co. Bulletin R-131.

### Heat Treated Forgings

Facilities for heat treating of "forgings to your specifications" are to be had at Kropf Forge Co. Their equipment and range of products are given in Bulletin R-132.

### The Laboratory

The latest issue of Fisher Scientific Co.'s interesting little magazine, "The Laboratory," containing articles of historical and practical value, may be had by sending for Bulletin R-133.

### Aluminum Castings

A new edition of the British Aluminium Co.'s booklet on "Aluminum Alloy Castings" contains the latest casting specifications of the Society of Automotive Engineers and the American Society for Testing Materials in condensed form. Bulletin R-134.

### Propane

Phillips Petroleum Co. has a bulletin on their Industrial Propane Gas Service, its method of utilization, transportation and storage, and advantages and economies. Bulletin R-135.

### Plate Mill Pictures

A pictorial summary of the work of the "World's Largest Plate Mill and Its Products" is issued by Lukens Steel Co. and its divisions. Bulletin R-136.

### Combustion Train

A highly efficient and practical combustion train for modern metallurgical laboratories is the Chevrolet Motors Type sold by E. H. Sargent & Co., dealers in laboratory supplies. It is described in Bulletin R-137.

### Laboratory Supplies

All sorts of laboratory supplies, apparatus, and chemicals are carried by Central Scientific Co., who also issue "Cenco News Chats," a bulletin containing interesting little stories of their products. Get the latest issue by sending for Bulletin R-138.

### Die Steels

Darwin & Milner have two folders on their "Neor" non-deforming high carbon chromium and "Patent Cobaltchrome" steel for dies. Properties, applications, and detailed instructions for treatment are given. Bulletin R-127.

### Seamless Tubing

A most interesting circular detailing the manufacture and production of cold drawn seamless tubing in a complete but non-technical manner is obtainable from Summerville Tubing Co. Bulletin R-128.

### Nickel Silver

Seymour Mfg. Co. has a folder which gives the story of nickel silver—its historical background, preferred composition, applications, shapes available, and modern method of manufacture. Bulletin Ax-48.

### New Homo Furnace

The new Homo furnace described in a bulletin issued by Leeds & Northrup provides for even tempering on a very dense load. Automatic control includes a feature that prevents overshooting. Fine tempering on extra dense loads at low cost is provided. Bulletin Mx-46.

### Safety in Oxwelding

A revised edition of "Precautions and Safe Practices" in the care and handling of oxy-acetylene equipment has been prepared by Linde Air Products Co. This booklet is regarded as a standard reference on this phase of safety in industry, and this latest edition contains some new suggestions required by advances in the oxy-acetylene process. Bulletin Mx-63.

### Tubing Weight Tables

Timken Steel & Tube Co. has issued a series of "Master Weight Tables" for round steel tubing, on letter size heavy paper, punched for binding. Weights per linear foot of lengths given for all sizes of hot finished and cold drawn tubing. Bulletin Mx-71.

### High Tensile Steels

Three types of high tensile steel particularly adapted to the transportation industries are described in a folder from U. S. Steel Corp. These are a chromium-copper-silicon steel for corrosion resistance, a medium manganese steel, and a strong structural silicon steel. Bulletin Mx-79.

### Box-Type Furnaces

The advantages of Hevi Duty box-type electric furnaces are concisely stated in a folder which contains specifications and a fully labeled cross-section of a representative furnace. Bulletin Mx-44.

### Turbo-Compressors

The new items in Spencer Turbine Co.'s bulletin are a new and smaller "Midget" turbo for individual mounting, a single-stage line which effects new economies, and the gas-tight turbines for acid and explosive gases. Bulletin Mx-70.

### Sensitive Controller

Unique features of Foxboro pyrometer controller which give it high sensitivity, essential for good control, are given in Bulletin Mx-21.

### Annealing Stamping

Operating data on a controlled atmosphere furnace for bright annealing steel stampings are given in an illustrated folder offered by Surface Combustion Corp. Among the advantages listed are economy of fuel consumption and elimination of necessity for pickling. Bulletin Mx-51.

### Hardening High Speed

No spoilage when high speed steel is hardened in Certain Curtain electric furnaces, claims a recent booklet of C. I. Hayes, Inc. Grain growth is controlled and the most delicate tools develop maximum hardness without decarburization, scaling or fusion. Bulletin No-15.

### The Enduro Family

A new edition of Republic's booklet on the Enduro 18-8 family of stainless steels includes among other authentic data a table showing corrosion resistance in the presence of several hundred chemicals, solutions, and other reagents. Bulletin Mx-8.

### Misco Alloys

Compositions, properties, and applications of Misco stainless, heat, and corrosion resisting castings are given in an illustrated folder offered by a pioneer producer, Michigan Steel Castings Co. Bulletin Mx-84.

### Cold Drawn Shapes

Many applications of cold drawn squares and flats are enumerated by Union Drawn Steel Co. in this folder. Sizes, grades of finish, and compositions available are listed. Nv-8.

### Controlled Steels

Carnegie Steel Co. has published a very interesting booklet which describes in some detail the process control used in the production of uniform steels. Bulletin Je-85.

### New Joining Process

Metal parts are joined cheaply, neatly and strongly by Electric Furnace Co.'s new, inexpensive non-oxidizing furnace atmosphere and their new, continuous brazing, coppering and soldering furnaces. Full details are given in Bulletin Ar-30.

### Coated Electrodes

Murex heavy mineral coated electrodes are the subject of a well-conceived booklet prepared by Metal & Thermit Corp. Emphasis is laid on the metallurgical merits of a heavy, all-mineral coating. Many practical hints on welding are included. Bulletin Jr-64.

### Recuperators

Results obtained with Carborundum Company's recuperators using Carborundum tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data regarding application to various types of furnaces are given in Bulletin Fx-57.

### Sheffield Steels

Wm. Jessop & Sons, Inc., have a leaflet which tells why a special anneal and a proper balancing of carbon, manganese, and tungsten combine to make Sheffield Superior oil hardening steel non-distorting and easily machinable. Bulletin Jn-61.

### Shielded Arc Welding

Lincoln Electric Co. offers a very fine descriptive booklet describing the process of welding with a shielded arc. Text and illustrations are designed to acquaint engineers with the possibilities of the process. Bulletin Ob-10.

### Phosphor Bronze

American Brass Co. tells why Anaconda "Special" phosphor bronze can be used advantageously for bushings, bearings, gears, and other screw machine products. It is a truly free-cutting alloy and does not foul cutting tools. Other properties are given in this new edition of their booklet. Bulletin Fx-89.

### Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

### Electric Furnaces

The electric furnaces made by Hoskins Mfg. Co. are well presented in their latest catalog. Contents include data on 17 types of furnaces and some valuable information on Chromel resistance wires and thermocouples. Bulletin Sp-24.

### Quenching Handbook

E. F. Houghton & Co. have published an excellent 80-page handbook on the subject of quenching. More than 30 charts and photomicrographs help tell the story. A copy will be sent free to those who request it. Bulletin JI-38.

### Tempering Furnace

Technical details and operating data on Lindberg Steel Treating Co.'s new Cyclone electric tempering furnace, which has shown a remarkable performance record in steel treating operations, are given in Bulletin Fx-66.

### Foundry Pyrometer

A leaflet from Pyrometer Instrument Co. briefly sets the advantages and operation of their Pyro Immersion Pyrometer for foundry use. This compact, self-contained instrument can be operated with one hand. Bulletin Fx-37.

### Photocell Pyrometers

Recording potentiometers using a beam of light, a mirror galvanometer, and a photoelectric cell give instantaneous control with high sensitivity and accuracy. The different varieties made by C. J. Taglibue Mfg. Co. are described in a 16-page letter-size booklet. Bulletin Fx-62.

### Pre-Heating Furnace

General heat treating operations up to 1900° F., preheating of high speed steel, annealing and firing of glass are some of the applications listed in American Electric Furnace Co.'s folder on their new model B-20 furnace. Bulletin Jx-2.

### Dark Room Layout

A novel card 9½×13 in. containing suggested arrangements for a photomicrographic dark room has been designed by Bausch & Lomb. Costs for installations are estimated, and on the reverse side are printed rules for using the dark room. Bulletin Jx-35.

### Radium Radiography

Advantages of portability, ease of application and manipulation in examination of castings, forgings, molds, weldings, and assemblies are attributed to radium for industrial radiography. Details are given in a booklet issued by Radon Co. Bulletin Jx-56.

### Blast Cleaning

A centrifugal machine which cleans castings without the use of compressed air is the subject of Pangborn Corporation's new folder. How and why 1800 lb. of castings can be cleaned in 8 min at low cost is told. Bulletin Jx-68.

### Electric Furnaces

A wealth of information on controlled atmosphere electric furnaces is contained in General Electric Co.'s booklet by that name. Detailed data are given on electric brazing in particular. Bulletin Jx-60.

### Fast-Cutting Steel

Bliss & Laughlin, Inc., offer an interesting technical folder on Ultra-Cut Steel, giving performance records of this high-speed screw stock on automatic screw machines. Physical data and microstructures are presented. Bulletin Ob-42.

### Alloy Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion, and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

### Aluminum Alloys

Working facts on aluminum—the properties and heat treatment of both cast and wrought alloys—are briefed for the manufacturer and designer in a booklet by Aluminum Co. of America. An appendix gives tables of physical properties, forms and sizes available. Bulletin Dc-54.

### The Review, 7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature described in the March issue. (Please order by number only.)

Name \_\_\_\_\_

Position \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

### Carburizing Boxes

Driver-Harris Co. devotes a folder to Nichrome cast carburizing boxes. Physical properties at room temperature and under operating conditions are given, as are the advantages of Nichrome castings for such service. Bulletin Jr-19.

### Molybdenum in 1934

Climax Molybdenum Co. presents their annual book giving new developments in molybdenum, particularly as an alloy with iron and steel. The engineering data presented are made clear by many tables and illustrations. Bulletin Dc-4.

### Cast Vanadium Steel

Jerome Strauss and George L. Norris have written a technical booklet for Vanadium Corp. of America describing the properties developed by steel castings containing various percentages of vanadium. Bulletin S-27.

### Testing with Monotron

Shore Instrument & Mfg. Co. offers a new bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Je-33.

### Carburizing Steel

High strength and ductility, forgeability, and machinability, combined with superior case carburizing properties, permit the attainment of maximum production with minimum cost. Such properties are obtainable in Jones & Laughlin's Jumbo steel. Bulletin Mx-50.

### Neophot

"Neophot" is the name of a new metallograph of radically new design and universal adaptability. A pamphlet distributed by Carl Zeiss, Inc., gives its applications and features, and is well illustrated with beautiful samples of micrographic work. Bulletin Jx-28.

### Cyanides and Salts

R & H Chemicals Department of E. I. du Pont de Nemours Co. has a new 28-page manual on the procedure for case hardening, nitriding, and mottling of steels with cyanides, and on coloring, tempering, and drawing with salts. Nv-29.

### Big-End-Up

Gathmann Engineering Co. briefly explains the advantages of steel cast in big-end-up ingots, showing the freedom from pipe, excessive segregation and axial porosity. An 82% ingot-to-bloom yield of sound steel is usual. Bulletin Fe-13.

### Metallograph

A new 36-page booklet of E. Leitz, Inc., contains all information on the Leitz large Micro-Metallograph, MM1. Excellent photomicrographs are reproduced to show its capacity. Special attention is given to the darkfield illumination feature. Bulletin Se-47.

### Heat Treating Manual

A folder of Chicago Flexible Shaft Co. contains conveniently arranged information on heat treating equipment for schools, laboratories and shops, and also illustrates the several types of Stewart industrial furnaces. Bulletin Ar-49.

### Manual of Pyrometry

Brown Instrument Co. offers an elaborate manual which describes the 50 exclusive features of their potentiometer pyrometer. The book will greatly interest those who must maintain accurate temperature. Bulletin Jr-3.

### Localized Heat Treating

American Gas Furnace Co. offers information on production machines for localized hardening, tempering or annealing of tools, saws, springs, screws and machine parts of all kinds, using gas as fuel. Bulletin Ag-11.

## Chamberlin Asks Data on Welding Duralumin Planes

Reported by H. F. Paulus

Lehigh Valley Chapter—Eighty-two members and feminine guests enjoyed the annual dinner meeting held at Hotel Taylor in Allentown, Pa. Bradley Stoughton, Chairman, presented the speaker of the evening, Clarence D. Chamberlin, noted trans-Atlantic aviator, who spoke on recent trends in the development of aviation.

In considering the various methods of construction it became quite apparent that the speaker was capable of discussing airplanes from the viewpoint of the designer as well as the pilot. The relative merits of riveting and welding methods of fabrication were pointed out, the speaker making an appeal to the American Society for Metals to contribute to the present insufficient knowledge of welding technique necessary for successful fabrication of an all-welded duralumin plane. Mr. Chamberlin expressed the opinion that not until tedious riveting methods of fabrication can be supplanted by a satisfactory welding method, can the cheaper midget type plane be made in sufficient quantities to compare with automobile production.

In comparing American development with European, the speaker expressed the belief that American commercial planes are capable of much higher sustained speeds than are the commercial planes of Europe. The apparent trend in American power equipment is favoring the twin-motor installation. Improvements in design now enable a pilot to retain control of a twin-motored plane even when one of the motors has failed to function.

At the close of Mr. Chamberlin's talk, the interest of his audience was plainly indicated by the many queries put to him.

When questioned as to the maximum speeds which might be achieved by future planes of the racing type, Mr. Chamberlin felt that momentary speeds of 500 to 600 m.p.h. would be developed in a fairly short time, but added that the top speed will hardly exceed 600 m.p.h. without radically redesigning the planes, as it has been calculated that above this speed the conventional types of wing construction could no longer function.

Recent developments in safeguarding the commercial pilot and passengers were described in some detail. Improved methods for preventing accumulation of ice are hoped for, and blind flying and landing by means of radio beams is considered a solution to many of the weather hazards which formerly hindered the continuous operation of air lines.

## Progress Made in Study Of Plastic Flow in Dies

Reported by R. R. Kennedy

Dayton Chapter, Feb. 12—At a joint meeting with the Society of Automotive Engineers E. V. Crane of E. W. Bliss Co. was the principal speaker, choosing as his subject "Correlation of Dies and Steels for Deep Drawing."

Mr. Crane traced the development of presses from the early hand-operated types to the latest automatic types used at the present time.

Great progress has been made in recent years in the study of plastic flow. Some of the investigations Mr. Crane described include the determination of the magnitude of the stresses set up in blanks during drawing operations, the manner in which the blanks deform, and the rate at which they harden due to cold work. These researches are of great practical value in predicting the behavior of a metal during drawing operations and designing dies to give best results.

Robert Weber of the National Cash Register Co. also spoke on "The Structural Characteristics of High Carbon Tool Steels"—one of a series of educational talks which are given by members of the Chapter.

## Washington Chapter Addressed by British Scientist at March Meeting

Reported by Clarence E. Jackson

Washington Chapter, March 7—The Chapter was fortunate in having as speaker and guest of honor at the regular meeting Dr. C. A. Edwards, F. R. S., Principal, University College of Swansea, England.

Our old friend "Bill" Eisenman was present, and gave a short, peppy talk reporting the progress of the Society in general and suggesting that during the coming year the Chapter aim at consolidation of ranks and normal expansion. Mr. N. I. Stotz, chairman of the Pittsburgh Chapter, was a most welcome guest.

Dr. Edwards, who adds to the group of eminent foreign authorities who have addressed the Washington Chapter during the past few years, came to this country to present the Annual Lecture of the Institute of Metals Division of the A.I.M.E. at the February meeting. His lecture on "Gases in Metals" was repeated for the Lehigh Valley Chapter on March 11.

The subject of Dr. Edwards' address to the Washington Chapter was "The Influence of Cold Rolling and Annealing on the Properties of Mild Sheet

Steel." He was introduced by W. M. Corse, one of our sustaining members.

The speaker described the growth of metallic crystals and showed the effect of temperature on atomic lattice structure of iron. The regular movement possible in a single crystal is interfered with at the grain boundary—hence as the size of the crystal diminishes, resistance to slip will increase. The crystal size of iron may be controlled by cold working followed by annealing at approximately 800° C.

In the mild steel used in this investigation, maximum crystal size was obtained with a 2.75% elongation followed by an anneal; with a high degree of cold work (over 40% elongation) the material after anneal will give a fine grain structure similar to the original. Heavy cold working, causing almost a complete recrystallization at annealing temperature, has the same effect on the structure as normalizing at a higher temperature.

Dr. Edwards stated that the grade of material obtained by heavy cold roll followed by anneal is as good as that by normalizing hot rolled material.

## Shipbuilding Improvement Depends on Strong Alloys

Reported by Paul S. Lane

Baltimore Chapter, Feb. 25—Shipbuilding—dugouts to battleships—and the new metals and alloys used in modern liners, were discussed by W. E. Blewett, Jr., assistant to the president, Newport News Shipbuilding and Dry Dock Co.

Weight saving in ships, particularly Navy vessels, is equally as important as in railroad and airplane construction. It is accomplished by using lighter sections of stronger alloyed materials. The recent interest in better fireproofing is tending toward greater use of stainless steels for bulkheads, flooring and gallery equipment. Along with these has come a decided increase in the use of welding rather than riveting.

The power plants are also being improved, and made more economical by the use of stronger alloy steels. Turbine blades, bearings, shafting and piping—from stem to stern, improvement in shipbuilding depends largely on metallurgical advances. Several movie reels illustrated the construction of the "President Coolidge," one of the largest American-built ships.

## Alloying and Heat Treating For Hardening Cast Iron

Reported by Ernest O. Olds

New Jersey Chapter, Jan. 14—The regular monthly meeting was held at the Hotel Elton in Newark. Our genial chairman, Mr. Hall, introduced the speaker of the evening, Mr. J. S. Vanick of the International Nickel Co. Mr. Vanick spoke with authority and experience on the "Hardening of Cast Iron" before an audience of about 150.

Since this talk is scheduled for publication in *Metal Progress*, it will be reviewed only briefly at this time.

According to the speaker, the purpose of hardening cast iron is to resist wear. The common methods employed are: (a) Direct alloying, (b) overalloying and then annealing, (c) heat treating, (d) nitriding or cyaniding, and (e) chilling white iron.

The discussion, in which E. S. Davenport of U. S. Steel Corp. Research Laboratory, W. R. Frazer of Eclipse Aviation Co., and John Wyzalek of Hyatt Roller Bearing Co., and others participated, brought out the following points:

1. Generally an alloy addition permits better heat treating results.

2. For each per cent increase of alloy, the melting point of the iron decreases approximately 50° C.

3. Austenitic cast iron, which is relatively soft, is used mostly for corrosion resistant properties rather than for its hardness.

## External Systems for Controlled Atmospheres Discussed by Esslinger

Reported by G. P. Halliwell

Pittsburgh Chapter, Jan. 10—The regular monthly meeting of the chapter was addressed by Dr. E. W. Esslinger, supervisor, Industrial Gas Division, The Union Gas and Electric Co., Cincinnati, Ohio, on the subject of "The Influence of Furnace Atmospheres on Correct Heat-Treatment Practice."

While Dr. Esslinger covered the general field of furnace atmospheres, both in gas fired and electric furnaces, he paid particular attention to those furnaces which use an external system for developing a controlled atmosphere. This is generally accomplished by a cracking process or partial combustion, giving essentially a reducing atmosphere. Considerable care must be taken in some operations to remove water or to keep the hydrogen-water ratio in excess of 1.3:1 as in the gas curtain type of furnace.

Bright annealing problems, Dr. Esslinger demonstrated, are solved by applying the laws of physical chemistry, especially those governing mass action and the heats of formation of oxides. Because carbon dioxide could become oxidizing or reducing under the proper conditions, and because of the preferential oxidation of some metals or the tendency of others to form nitrides, it was emphasized that every alloy composition really requires its own particular furnace atmosphere.

The treatment of high speed steel tools or parts in controlled atmosphere without the loss of metal by oxidation was explained. The pieces are heated to 1600° F. in a preliminary furnace with a slightly oxidizing atmosphere. They are then transferred to a second furnace at 2300° F. with a strongly reducing atmosphere, from which they are quenched and drawn. The thin film of oxide formed in the first furnace is reduced to the metallic state in the second.

## Wage Rates Higher in U. S.

Steel mill employees in the United States earn an average of 120 to 650% more per hour than workers in foreign mills, according to a calculation made recently by the American Iron and Steel Institute.

American workers who are paid on an hourly, piecework, or tonnage basis earned an average of 64.7c per hr. in Nov., 1934.

Latest figures for foreign countries show an average hourly wage rate between 17 and 27c for the European countries, 25.1c for Great Britain, 29c for Sweden, 8.6c for India, and 9.7c for Japan.

## Properties of Graphite Must Be Considered in Design of Cast Parts

Reported by A. O. Schaefer

Philadelphia Chapter, Feb. 22—George Washington's Birthday, a snow-storm, and a surprise visit from Bill Eisenman conspired with an excellent talk by Dr. J. T. MacKenzie of the American Cast Iron Pipe Co., on "Modern Cast Iron" to make this night memorable for the Philadelphia Chapter.

The Philadelphia Foundrymen's Association had accepted the Chapter's invitation to make this a joint meeting, and a number of their members helped enliven the discussion.

Dr. MacKenzie's talk was in reality a consideration of the role of graphite in the results of transverse tests on cast iron. Excellent photomicrographs of graphite formations introduced the talk, which later developed into a discussion of the engineering properties of these various cast irons.

The importance of design was demonstrated by cooling curves showing the changes in specific volume during solidification. The formation of graphite causes expansion on freezing. This phenomenon may cause adjacent sections to be expanding and contracting at the same time.

It was seen that graphite particles function as solid blocks in compression, and as voids in tension.

In the lively discussion following Dr. MacKenzie's paper, the speaker expressed a belief that it is possible to make alloy cast irons in the cupola as well as in the electric furnace, but that it is much easier in the latter. He believes the superheating possible in the electric furnace is beneficial, and inclines to the theory that the resulting graphite structure is brought about by finely divided silicates.

## Lecturers Rewarded for Work on New Haven Course

Members of the New Haven Chapter who presented the eight lectures in the chapter course just completed were entertained by the New Haven Executive Committee on February 7, and were presented with tokens of appreciation for their work.

Eight lectures were presented by Henry Griggs, J. A. Durr, R. L. Baldwin, S. C. Spalding, R. M. Brick, L. E. Raymond, and A. D. Eplett, covering the subject of general steel metallurgy from the production of pig iron through to physical testing.

Average attendance for the course was 80, registration 100, and a jump in chapter membership from 125 to 170 was attributed to the lectures.

Real credit for the success of the course should go to S. C. Spalding and M. W. Brewster, chairman and secretary respectively of the Lecture Course Committee which put this series through with a bang.

## Appointed to Executive Committee

E. F. Burke, district representative, C. I. Hayes, Inc., has been appointed a member of the Executive Committee of the Cleveland Chapter to fill out the unexpired term of R. E. Paine, Aluminum Co. of America, who has been transferred from Cleveland to Oakland, Cal.

## HARD CHROMIUM PLATE

Tube drawing dies and plugs, bakelite and golf ball molds, machine parts plated to your specifications.

**The Industrial Plating Co.**

98 Putnam Ave. Centredale, R. I.

# THE REVIEW

## Addition of Molybdenum Retards Transformations, Gives Deep Hardening

*Reported by John W. McBean*

Ontario Chapter, Feb. 1—A. J. Herzig and A. V. Crosby of the Climax Molybdenum Co. presented to the February meeting an illustrated talk on "Molybdenum in Steel."

The action of molybdenum in retarding the transformations in steel produces deep hardening with minimum distortion. It also gives greater hardness and strength for a given drawing temperature, and machinability at higher hardness.

Molybdenum tends to refine the grain and increase toughness; it reduces temper brittleness and gives good forging properties. In the carburizing grades it tends to increase the rate of penetration.

It was pointed out that the value of molybdenum in steels and cast irons sometimes depends on the fact that it increases the useful effect of other alloys. An example of this is a very small amount used in low carbon iron to increase the corrosion resistance produced by copper. Molybdenum also resists grain growth and gives a close grain at the center of large castings, with high strength and good machinability. It reduces shrinkage and strain and increases wear resistance.

Molybdenum is also coming back into favor in high speed steel to replace a larger amount of tungsten, giving a lower quenching temperature and lower cost.

We were delighted to have with us also William Park Woodside, trustee and honorary member, who gave us a few of his experiences.

Between the dinner and the technical session we enjoyed an entertaining movie loaned by the Bell Telephone Co.

## Good Discussion on Cast Iron Structural Members

*Reported by Carl B. Rex*

Peoria Chapter, Feb. 11—H. Bornstein, chief metallurgist of Deere & Co., Moline, Ill., presented the subject of "Cast Iron" to an audience of 164 members and guests.

Mr. Bornstein discussed the raw materials, types of melting equipment used, chemistry of certain alloys, and their effects on the properties and usages of cast iron. Lantern slides were used for illustration throughout the talk instead of occupying a single period of time.

Much interest was found in the subsequent discussion on the use of cast iron in dynamic structural members such as automobile crankshafts and starting motor cranks for diesel engines. Hardened cast iron piston rings, first introduced by "Caterpillar," were also a matter of interest.

## Employment Service

Address answers care of A. S. M., 7016 Euclid Ave., Cleveland, unless otherwise stated

### POSITIONS WANTED

MASTER'S DEGREE in metallurgy. Experience in heat treating, metallography, physical testing and inspection, cold draw production supervision. Research work has been published. Box 3-5.

ARC WELDING SPECIALIST: Staff work, development of processes, production, research on bare and fluxed electrodes. Employed now. Worked my way through technical college. An engineer who can see the management's viewpoint, yet understand the practical shop problems. Box 3-10.

PHYSICAL METALLURGIST and chemist: Ph.D. 31, married. Two years' industrial experience with ferrous and non-ferrous fabrication problems. Two years' special work on heat treatment of steels and other alloys. Desires research position with a producing or fabricating company where knowledge of alloy systems and of methods of investigation is desirable. Available immediately. Box 3-15.

KNOWS HEAT TREATING from A to Z, majoring in alloy and high speed steel. Also able to handle men. Best of references furnished. Box 3-20.

### POSITION OPEN

YOUNG MAN: Energetic, with knowledge of tool steel business, to assist in sales. Cleveland territory. Box 3-25.

## Civil Service Examinations Announced

The United States Civil Service Commission has announced open competitive examinations for the following positions:

1. Assistant Naval Architect. Applications must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than April 1, 1935. Optional branches: Ship piping and ventilation, hull structures and arrangements, scientific ship calculations, and general.

2. Junior Physicist. Applications must be on file not later than April 8. Optional subjects are: Electricity, heat, mechanics, and optics. Applicants must have been graduated from a college of recognized standing with at least 24 semester hours in physics.

3. Chemist, Senior, Associate, and Assistant Chemists. Applications must be on file by April 8. A number of existing vacancies in the Food and Drug Administration, Department of Agriculture, will be filled from these examinations, as well as a vacancy for assistant chemist in the Dental Alloy Laboratory, National Bureau of Standards.

4. Boiler and Hull Inspectors. Applications for the positions of local and assistant inspectors of boilers and hulls, Bureau of Navigation and Steamboat Inspection, must be on file with the Commission not later than April 15.

Full information about these examinations may be obtained from the Secretary of the United States Civil Service Board of Examiners at the post office or custom-house in any city or from the United States Civil Service Commission, Washington, D. C.

## Cincinnati Chapter Holds Round Table Discussions

A special educational feature sponsored by Cincinnati Chapter is a series of round table discussion meetings.

The first one, held in January, was addressed by J. D. Judge of Hamilton Foundry & Machine Co. on "Meehanite Cast Iron." At the February round table H. Stanley Binns, chief metallurgist, Cincinnati Milling Machine Co., led the discussion on "Case Hardening."

Practical experiences were exchanged at both of these meetings and those who attended are looking forward with anticipation to March 28 when R. L. Kenyon of American Rolling Mill Co. is expected to speak on "Mechanical Testing and Preparation of Specimens for Microscope."

Meetings were open to non-members, several of whom joined the Society.

## 140 Enroll in Northwest Chapter Course on Steel

The "Practical Course on Steel" conducted by Northwest Chapter (six meetings starting Jan. 30 and ending March 13) was attended by 140 men. Lectures were held at local plants, where practical demonstrations could be conducted.

The Chapter meeting on Feb. 12 was addressed by N. L. Deuble of Republic Steel Corp. on "Metallurgical Inspection." Specifications and tests for steel were considered as well as standard methods of detecting flaws and defects.

In discussing the factors which control hardenability, it was pointed out that the McQuaid-Ehn grain size test is sometimes used in specifications for steels other than carburizing grade, where the results of this test are often misinterpreted and are usually less reliable than specific hardenability tests.

## Gas Cutting Described And Demonstrated at Montreal Joint Meeting

*Reported by G. Sproule*

Montreal Chapter, Jan. 7—in spite of very unseasonable mild weather that made travel difficult, this meeting will stand as a milestone in local engineering annals.

After the usual dinner at the Windsor Hotel, at which there were 75 members and guests, including a contingent from the Engineering Institute of Canada, headed by President F. P. Sherwood, the party proceeded to the large lecture hall of the Dominion Bridge Co., Lachine. Here they were welcomed by A. H. Cowie and C. R. Whittemore. By the time the lecturer, Richard Helmkamp of Air Reduction Sales Co., New York, got under way, a gathering of 500 filled the hall.

Mr. Helmkamp, speaking on "Some Practical Aspects of Machine Gas Cutting in Modern Fabrication," explained how this method has modified manufacturing processes, especially in conjunction with electric arc welding. Automatic or semi-automatic and portable machines are available for making square or beveled cuts in plates up to 10 in. thick; structural shapes and pipe are just as easily handled. The cut compares with a rough machining cut, and the torch may be guided manually or automatically by a template.

Machines fitted with multiple torches, working on plates of moderate thickness, can compete with punch presses unless the requirements are for a very large number of pieces such as would warrant the expense for dies. On heavy plate or pieces with beveled edges, outside the capabilities of a punch press, the torch is a miracle.

Chairman F. O. Farey called on Charles E. Herd to propose a vote of thanks to Mr. Helmkamp, the Dominion Bridge Co., Railway & Engineering Specialties, Ltd., Liquid Air Co., and Lefebvre Frères, Limited, who cooperated in arranging the lecture and demonstration.

The gathering then descended to one of the Bridge Co.'s large shops and saw several cutting machines in actual use.

One of the features which appealed to the layman, as well as to the engineer, was a demonstration of the new MetaLayeR Spray Gun—a piece of equipment which opens new fields in the decorative arts as well as the engineering industries. Steel and other base metals are coated with more resistant or decorative metals. Production of hardened surfaces, the building up of worn parts of equipment, and protection against corrosion are some of the features.

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|   |   |
|---|---|
| BALTIMORE—Stanley P. Watkins, Rustless Iron Corp. of America      | Apr. 18—Open Discussion Meeting                             |
| Mar. 25—Tool Steels .....   | J. P. Gill  |
| BOSTON—H. E. Handy, Saco-Lowell Shops, Biddeford, Maine           | May 16—Testing of Metals .....                              |
| Apr. 5—Joint New England Meeting at Providence                    | H. C. Mann  |
| May 3—Flame Cutting of Metal .....                                | Ryerson & Son, Inc.   |
| CANTON—L. L. Ferrall, Timken Steel & Tube Co.                     | Apr. 8—Manufacture and Heat Treatment of Springs .....      |
| Mar. 21—Swords & Plowshares .....                                 | J. A. King  |
| Apr. 18—Electric Welding .....                                    | G. T. Williams  |
| CHICAGO—K. H. Hobbs, Driver-Harris Co.                            | Apr. 22—Welding .....                                       |
| Apr. 11—Corrosion Protection .....                                | T. N. Holden, 1219 Glenwood Rd., Brooklyn                   |
| Apr. 26 (tentative)—Plant Inspection, International Harvester Co. | L. C. Bibber  |
| May 9—Testing of Steel .....                                      | Apr. 22—Refractories .....                                  |
| N. C. Strohmenger, Tool Steel Gear & Pinion Co.                   | Apr. 29—Controlled Atmosphere Furnaces .....                |
| Apr. 15—Tri-Chapter Meeting at Dayton                             | Jordan Korp   |
| CLEVELAND—G. T. Williams, Cleveland Tractor Co.                   | NEW YORK—T. N. Holden, 1219 Glenwood Rd., Brooklyn          |
| Apr. 1—Bearing Metals .....                                       | Apr. 15—Making of Steel .....                               |
| May 6—Special Steels .....  | Apr. 13—Metallurgical Control .....                         |
| COLUMBUS—L. H. Marshall, 3629 Weston Place                        | G. C. Riegel  |
| Apr. 15—Tri-Chapter Meeting at Dayton                             | PEORIA—A. O. Schaefer, The Midvale Co.                      |
| DAYTON—F. M. Reiter, Dayton Power & Light Co.                     | Mar. 29—Metallurgy of Welding .....                         |
| Apr. 15—Tri-Chapter Meeting                                       | Apr. 26—Stainless Steels in the Chemical Industries .....   |
| May 13—Inaugural Party; Plant Visitation                          | June 7—Plant Visitation Lukens Steel Co.                    |
| DETROIT—Glenn Coley, Detroit Edison Co.                           | PITTSBURGH—H. L. Walker, Box 521, N. S. Stanton             |
| Apr. 8—Carbon in Steel .....                                      | Mar. 28—Heat Treating Tool Steel .....                      |
| May 13—Helical Springs .....                                      | Jordan Korp   |
| H. M. Williams  | Apr. 11—Steels at High Temperature .....                    |
| INDIANAPOLIS—Elam E. Williams, J. D. Adams Co.                    | May 9—Hardening of Steels .....                             |
| Apr.—Normalizing; Effect on Machinability                         | F. B. Foley   |
| May—Drawing Temperatures for Tool Steels .....                    | RHODE ISLAND—C. G. Peterson, Providence Gas Co.             |
| MILWAUKEE—W. J. Sparling, Chain Belt Co.                          | Apr. 5—Materials for Aircraft .....                         |
| Apr.—   | May—Furnace Atmospheres .....                               |
| H. J. French  | ROCHESTER—I. C. Matthews, Eastman Kodak Co.                 |
| MONTRÉAL—B. W. Brownrigg, P. O. Box 371, Sta. H.                  | May—F. R. Palmer  |
| Apr. 1—Alloy Irons .....  | SCHENECTADY—Lyall Zickrick, General Electric Co.            |
| May 6—.....   | Mar. 26—.....   |
| T. Holland Nelson   | Apr. 16—Research on Physical Properties of Metals .....     |
| NEW HAVEN—M. J. Radecki, H. G. Thompson & Son Co.                 | H. C. Mann  |
| Mar. 21—Alloying of Steel .....                                   | ST. LOUIS—C. A. Mulligan, Ziv Steel & Wire Co.              |
| Apr. 5—Joint New England Meeting at Providence                    | Mar. 22—Zinc .....  |
|   | W. M. Peirce  |
|   | Apr. 19—Heat Treatment of Cast Ferrous Metals .....         |
|   | A. E. Rhoads  |
|   | May 17—.....  |
| W. J. Wilson, Naval Gun Factory                                   | F. A. Lawler  |
| Apr. 10—Admire .....  | TRI-CITY—R. H. Lind, Peoples Light Co., Davenport, Iowa     |
| May 8—.....   | Apr. 9—Stainless Steels .....                               |
| Zay Jeffries  | O. K. Parmister   |
| WORCESTER—R. R. Tatnall, 38 Parkton Ave.                          | May 14—Inspection of X-Ray Equipment at Rock Island Arsenal |
| Apr. 5—Joint New England Meeting at Providence                    | WASHINGTON—Evan F. Wilson, Naval Gun Factory                |
| May 9—Atmosphere Effect on Hardening                              | Apr. 10—Admire .....  |
| Carl Hayes  | Wm. B. Price  |